



Invasive Crab Data Study @ Moose Point State Park, Searsport, ME

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Motivation

- ◆ Relevant (local implications) & Educational
 - A local issue
 - *Hemigrapsus sanguineus* - Asian Shore Crab
 - Monitor the pending arrival to Moose Point State Park
 - May have an impact on the juvenile lobster populations (Demeo & Riley, 2006)
 - Connecting Students to their Community
 - How People Learn, 2000
- ◆ Educational
 - Modeling the scientific process
 - Conducting experiments
 - Collecting, analyzing and sharing data



Prior to Field Trip

- ◆ Presentations & handouts
 - Zonation, habitat competition & tides
 - Native & invasive marine species
 - Past impacts and potentially new threats
 - Vectors
 - Maine EcoBeaker (habitat competition)
 - Field guides
- ◆ Identification methods
 - Practice handling live specimens
 - Tank room / temporary aquarium
 - Dried carapaces & live specimens
 - Identify species & gender
 - Practice measuring with calipers



Prior to Field Trip

- ◆ Research Methods
 - Timed Transect Method
 - Practice measuring transect
 - Establish & standardize all of the data collection steps
- ◆ Expose Students to GPS Sensors
 - Obtain & download coordinates of the practice transects
 - Google Earth (share maps online)
 - Mock GeoCaches
- ◆ Discuss Stewardship
 - Replacing rocks
 - Returning animals
 - Minimizing human impact



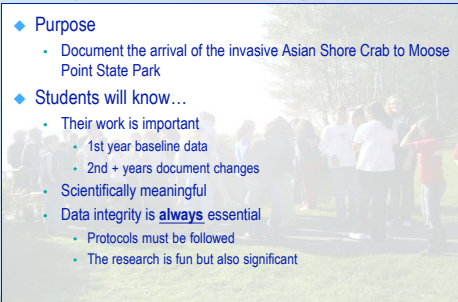
Prior to Field Trip

- ◆ Assign Student Transect Leaders
 - Maintains the integrity of the collection process
 - Scope out location (low tidal - mid tidal range)
 - Set up transect
 - Start/stop hunt on time
 - Stewardship
- ◆ Assign Data Specialists
 - Maintains the integrity of the data recording
 - Measuring
 - Identification
 - Data sheets are filled out completely & appropriately



Mission *(Crab Hunters Unite)*

- ◆ Purpose
 - Document the arrival of the invasive Asian Shore Crab to Moose Point State Park
- ◆ Students will know...
 - Their work is important
 - 1st year baseline data
 - 2nd + years document changes
 - Scientifically meaningful
 - Data integrity is **always** essential
 - Protocols must be followed
 - The research is fun but also significant



Moose Point State Park



- Mid Coast Maine
- Rocky
- Gently sloping intertidal



Benefits & Limitations of Transects

◆ Benefits

- Detects the presence or absence of rare or newly occurring species
- A quick & simple way to measure the relative abundance of species
- Easy to implement with minimal training
- Entry level- appropriate for middle schools

◆ Limitations

- Does not provide population density data
 - Measurement of population densities are a comprehensive method for scientific research studies-quadrates



<http://www.coml.org>

4 years of Data

◆ September 2006

◆ 40 students

- Mixed Grades 7 & 8

◆ Timed Transects

- 5 transects
- 8 students/transect
- Low tidal to mid
 - + 0.5 m Mean Low Tide
- Practiced outside transect 10 minutes
- Official hunt - 20 minutes

◆ October 2007

◆ 40 students

- Mixed Grades 7 & 8

◆ Timed Transects

- 8 transects
- 5 students/transect
- Low tidal to mid
 - + 0.5 m Mean Low Tide
- Practiced outside transect 10 minutes
- Official hunt - 20 minutes

4 years of Data

◆ September 2008

◆ **46 students**

- Mixed Grades 7 & 8
- ◆ Timed Transects
 - **9 transects**
 - **5-6 students/transect**
 - Low tidal to mid
 - + 0.39 m Mean Low Tide
 - Practiced outside transect 10 minutes
 - Official hunt - 20 minutes

◆ September 2009

◆ **51 students**

- Mixed Grades 7 & 8
- ◆ Timed Transects
 - **10 transects**
 - **5-6 students/transect**
 - Low tidal to mid
 - + 0.42 m Mean Low Tide
 - Practiced outside transect 10 minutes
 - Official hunt - 20 minutes

This Spot Looks Interesting



Let The Hunt Begin



Careful Measures



Recording Data



Average #Crabs/Students/Time by Year

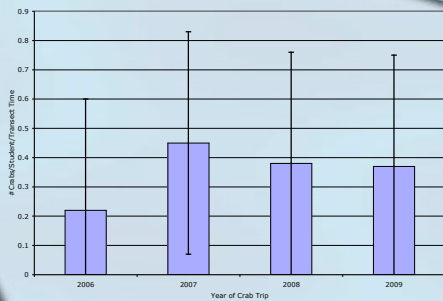


Fig. 6 bar graph depicting the average #Crabs/Student/Time by years

Results for 2006

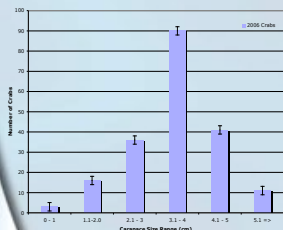


Fig. 1 bar graph depicting the 2006 green crab size distribution (carapace width by number of crabs found)

◆ 197 crabs collected

- All Green
- 100 male/ 97 female
- Mean = 3.5 cm
- Median = 3.6 cm
- Mode = 3.6 cm

◆ Transect Data

- #crabs/student/time
- 0.25 Transect 1
- 0.16 Transect 2
- 0.14 Transect 3
- 0.21 Transect 4
- 0.39 Transect 5
- Average 0.23

Results for 2007

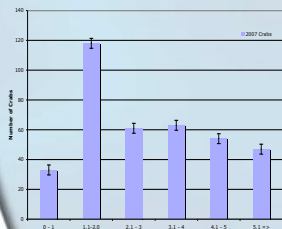


Fig. 2 bar graph depicting the 2007 green crab size distribution (carapace width by number of crabs found)

◆ 376 crabs collected

- All Green
- 245 male/ 131 female
- Mean = 3.0 cm
- Median = 2.8 cm
- Mode = 1.5 cm

◆ Transect Data

- #crabs/student/time
- 0.60 Transect 1
- 0.05 Transect 2
- 0.49 Transect 3
- 0.46 Transect 4
- 0.28 Transect 5
- 0.71 Transect 6
- 0.82 Transect 7
- 0.24 Transect 8
- Average 0.46

Results for 2008

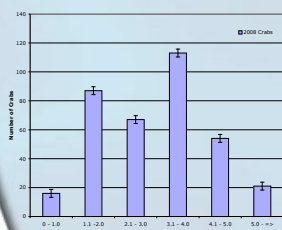


Fig. 3 bar graph depicting the 2008 green crab size distribution (carapace width by number of crabs found)

◆ 358 crabs collected

- All Green
- 228 male/ 130 female
- Mean = 3.1 cm
- Median = 3.1 cm
- Mode = 4.0 cm

◆ Transect Data

- #crabs/student/time
- 0.20 Transect 1
- 0.34 Transect 2
- 0.60 Transect 3
- 0.44 Transect 4
- 0.23 Transect 5
- 0.67 Transect 6
- 0.26 Transect 7
- 0.33 Transect 8
- 0.39 Transect 9
- Average 0.43

Results for 2009

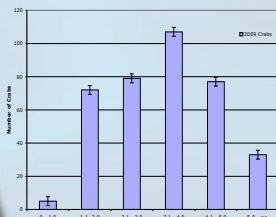


Fig. 4 bar graph depicting the 2009 green crab size distribution (carapace width by number of crabs found)

- ◆ 374 crabs collected
 - All Green
 - 240 male/ 133 female/1?
 - Mean = 3.4cm
 - Median = 3.4 cm
 - Mode = 4.0 cm
- ◆ Transect Data
 - #crabs/student/time
 - 0.60 Transect 1
 - 0.58 Transect 2
 - 0.42 Transect 3
 - 0.15 Transect 4
 - 0.37 Transect 5
 - 0.23 Transect 6
 - 0.63 Transect 7
 - 0.39 Transect 8
 - 0.19 Transect 9
 - 0.17 Transect 10
 - Average 0.37

2006 - 2009 Size Distribution (cm)

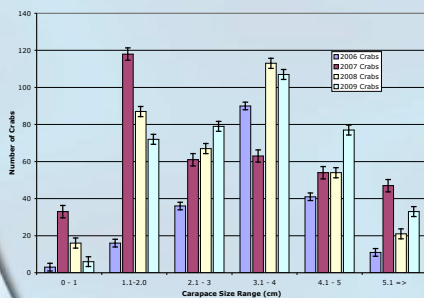


Fig. 5 bar graph depicting the green crab size distribution by years (carapace width by number of crabs found)

Conclusion & Discussion

- ◆ The Asian shore crab is either absent or present at levels below detection at Moose Point State Park.
- ◆ Continued Annual Monitoring is important...
 - Existence of Invasive Crabs can be an Indicator of the Health of Marine Ecosystem (a Biosensor)
 - U.Maine Climatology Institute was tasked by the Governor to use Organisms as Biosensors to Research Climate Change



Adding another Dimension



◆ Temperature Sensors

- *Camden to Katahdin*: A long term temperature study conducted by 20 Maine schools
- U. Maine RiSE (*Research in STEM Education*)
- Why Add 5 years of temperature data to our crab data? (McNeil *et.al.*, 2006)
